Guidance Document

Agronomic Utilization and Storage of Sewage Sludge

Maine Department of Environmental Protection

Not to be considered a substitute for reading, and becoming intimately familiar with, Chapter 2, and Chapters 400-419.

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THIS GUIDANCE IS A **DRAFT DOCUMENT** REVISED ON 5/16/02
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A copy of this document is available on the Department website at:
http://www.state.me.us/dep/rwm/residuals.htm

SECTION I

Purpose of This Guidance

The purpose of this guidance document is to provide information to those responsible for agronomic utilization and storage of sewage sludge. While this document is not a substitute for reading and understanding the appropriate regulations, it does provide information that will allow you to develop and manage a sewage sludge land application program.

Throughout this guidance you will find that there are various requirements specific to sludge utilization and management depending on the *characteristics* of the sludge.

SECTION II

Rules Relating to Agronomic Utilization

06-096 CMR Chapter 419, *Agronomic Utilization of Residuals (effective: July 19, 1999, revised: December 19, 1999)*, establishes requirements for agronomic utilization of residuals, and storage of residuals prior to utilization. The chapter references several other Department regulations. Other rules relating to agronomic utilization, for which you should have copies, are:

06-096 CMR Chapter 2, *Rules Concerning the Processing of Applications (effective: August 1, 1994)* provides the administrative standards for processing applications, as well as procedures for public notice, public hearing requests, appeals, etc.

06-096 CMR Chapter 400, *Maine Solid Waste Management Rules, General Provisions (effective: November 2, 1998, Revised: September 6, 1999)*, contains general standards for all solid waste facilities. Sludge utilization sites are considered solid waste facilities.

06-096 CMR Chapter 405, *Maine Solid Waste Management Rules, Water Quality Monitoring, Leachate Monitoring and Waste Characterization (effective: November 2, 1998, Revised: September 6, 1999),* establishes requirements for ground and surface water quality monitoring, leachate monitoring, and waste characterization.

06-096 CMR Chapter 502*, Direct Watersheds or Waterbodies Most at Risk from New Development, and Sensitive or Threatened Regions or Watersheds (effective: December 31, 1997)*, lists the watersheds for waterbodies most at risk from Development (see AppendixE for list of lakes most at risk).

Copies of rules are available from the Department of Environmental Protection. All DEP rules are also available at: www.state.me.us/sos/cec/rcn/apa/06/chaps06.htm

SECTION III

Who is Who at DEP

The Maine Department of Environmental Protection, Sludge and Residuals Unit is divided into four separate regions. Following are the four regions with the names, phone numbers, and FAX numbers for staff contacts:

Northern Maine Regional Office, Presque Isle

Jay Duncan	207-764-0477
FAX	207-764-1507

Eastern Maine Regional Office, Bangor

Rick Haffner	207-941-4570
FAX	207-941-4584

Central Maine Regional Office, Augusta

David Wright	207-287-2651
Jim Pollock	207-287-2651
Mark King	207-287-2651
FAX	207-287-7826

Southern Maine Regional Office, Portland

Mike Clark	207-822-6300
FAX	207-822-6303

If you have questions about sludge and residuals utilization in general, or specific questions about rules, licenses, license conditions, etc., please call the staff person in your region. If you are unable to reach that person, please call staff persons in any of the other regional offices.

SECTION IV

Definitions of Key Words

Sewage sludge is the solid, semi-solid or liquid residue generated, at a treatment facility, during the treatment of waste and wastewater derived from humans or household activities. *De-watered septage* is the solids fraction of septage derived through separation from the liquid fraction. This guidance document will use the phrase “sewage sludge”, which is to be interpreted as either sewage sludge or de-watered septage.

Agronomic utilization of sewage sludge is the land application of sewage sludge in a controlled manner with the intention of providing for the nutritional needs of the crop to be grown.

Land application is the spraying or spreading of sewage sludge on the ground surface or incorporating the sewage sludge below the ground surface.

SECTION V

Licenses Required for Sludge Utilization

All sewage sludge land application sites must be licensed by the Department. Licenses are issued only to the sewage sludge generator. For sludge land application, the generator must have a Program License, and have individual site licenses. These license types are further explained below.

Program License

All sewage sludge generators must obtain a **Program License** if they plan to land apply sewage sludge. A Program License is a license in which, based on the information submitted to the Department by the generator, the Department assesses the potential benefits and risks posed by utilization of the applicant's sludge. The license also contains management strategies that are necessary to mitigate potential risks. Under the Program License, land application of sewage sludge requires a **site-specific license** for each individual site on which you propose to spread sewage sludge. If you are currently land applying sewage sludge, and do not have a site-specific license, you are in violation of Department regulations. For generators who land apply sewage sludge, an application for a Program License should have been filed on or before **July 19, 2000.**

Specific application requirements for Program and site-specific licenses are contained in Chapter 419. Licenses do not expire, as long as you submit all appropriate reports and fees as required by Chapter 419, and your license.

Joint Utilization of Sites

If more than one sludge generator intends to license the same land applicaton site, the generators must develop, and sign, a *Joint Utilization Agreement*. The agreement must specify the responsibilities of each generator, and must identify one of the generators as the contact that the Department can direct to correct any deficiencies at the site. The agreement must be filed with the Department and must have Department approval to be implemented.

Program License Transfer

If a generator *facility* is transferred to a new owner, the new owner must obtain Department approval to transfer the Program License and any individual site licenses, if the new owner proposes to continue land application. This transfer must be completed in accordance with Chapter 2, Section 17, and Chapter 400, Section 3.B (3).

Site License Transfer

A site license can be transferred from one generator to another, provided that both generators agree to the transfer. For sludge sites, if both generators produce sewage sludge, and the sludge is treated to the same pathogen reduction standards, then the transfer can be completed as a Permit-by –Rule (Chapter 419, Section 9). Otherwise, the transfer must be completed in accordance with Chapter 2, Section 17, and Chapter 400, Section 3.B (3). The Department recommends that a final heavy metals analysis be performed on representative soil samples at the site. This will provide the transferring generator with a record of the site condition after that generator has ceased using the site.

Application Submissions

The Department requires that specific items be submitted for each type of license, on forms supplied by the Department. Contact the residuals utilization unit to obtain the appropriate form for your project. These forms are updated periodically, so make sure you are using the latest one. Forms are available in electronic or hard copy form.

Municipal and Public Notice for Program Licenses

Public notification of submittal of an application for a Program License must be filed with the municipality in which the sludge is generated. The notice must also be published once in a newspaper with general circulation in the municipality which the sludge is generated, and once in the daily newspaper circulated in Augusta, Maine. The notices must be published, and provided to the municipality, no more than thirty (30) days before filing the application with the Department. The public notice requirements are contained in Chapter 2, Section 9.

Municipal, Public and Abutter Notice for Site Licenses

Public notification of submittal of an application for an individual site license must be filed with the municipality(ies) in which the sludge is proposed to be land applied. The notice must also be published once in a newspaper with general circulation in the municipality(ies) which the sludge is proposed to be land applied. The notices must be published, provided to the municipality, and provided to abutters, no more than thirty (30) days before filing the application with the Department. The public and abutter notice requirements are contained in Chapter 2, Section 9 (see Appendix A).

License Surrender

Any license for agronomic utilization of sewage sludge may be voluntarily surrendered to the Department. The Department must approve license surrender. The Department will approve the surrender of a license when the Department determines that all sludge transported to the site has been either fully utilized or completely removed from the site. The Department recommends that a final heavy metals analysis be performed on representative soil samples at the site. This will provide the generator with a record of the site condition after the generator has ceased using the site.

Valid Licenses During Rule Transition

Any sludge land application license issued under Chapter 567, which was valid on July 19, 1999, is considered valid under Chapter 419. *As of* **July 19, 2000,** *all sites were required to be operated in compliance with the operating standards of Chapter 419*.

Compliance with Chapter 419

Applications for modifications to existing, individual site licenses issued under Chapter 567, to incorporate new provisions of Chapter 419, including changes in setback distances, buffers, or loading rates, can be submitted as minor revisions, even if the revisions increase the site capacity. Requests for the addition of new fields, or new field stacking areas within a land application site must be submitted as amendments.

SECTION VI

Waste Characterization Sampling and Analytical Work Plan

Sewage sludge destined for land application must be analyzed to ensure that it meets the quality standards established in the rule. To address this requirement, sewage sludge generators must develop a *Waste Characterization Sampling and Analytical Work Plan*. The requirements for a work plan, as presented in Chapter 405.6.B., are as follows:

- identification of parameters to be analyzed and selection rationale
- sample collection methods, including a description of sampling equipment and how representative samples will be obtained
- sample point description
- sample size, sample type, and sample frequency
- procedures for decontamination of sampling equipment prior to sampling and between the collection of successive samples
- sample container, storage, and preservation procedures
- sample holding times
- sample handling, packaging, and transportation protocols
- sample documentation (labeling, chain-of-custody, log book, etc.)
- analytical methods
- estimated practical quantitative limits for each parameter to be quantified
- sampling and analysis quality assurance/quality control procedures
- data reduction, validation, and reporting methods, including methods of statistical interpretation of analytical results

The Department has issued a work plan guidance document that explains how such plans may be developed.

All soils at sewage sludge land application site must be monitored. The Department may also require other site monitoring, depending on the generator's proposal. The requirements for site monitoring are contained in Chapter 405. The results of all site monitoring activities should be reviewed prior to any land application. This will allow you to determine if land application should continue, or if adjustments must be made to your program.

If Analytical Results Exceed Standards

If a generator exceeds a residual or soil standard during utilization activities, the generator should immediately notify the Department. The Department will work with the generator to determine what action should be taken. Typically the generator should undertake one or more of the following actions, as appropriate:

- ***Confirm the data***: Check with the lab to make sure there are not any quality control issues associated with the sample, or any other errors in the analysis or data compilation. If the lab still has enough sample, you may want to have them re-analyze the sample (if holding times are still valid). You may also need to obtain a new representative sample and have that tested for the parameters of concern.

- ***Stop use of sludge***: Once an exceedence is detected, be sure to alert your personnel so that the material is not land applied until potential impacts can be fully assessed. If a contaminated residual is utilized, you may be facing a costly site investigation.

- ***Find the source***: work with your pre-treatment coordinator to investigate what led to the exceedence, resolve the problem, and set up appropriate protocols to avoid future problems.

- ***Increase the frequency of analysis***: You may need to perform more frequent testing for the parameters of concern, until you can get a handle on the variability and range of the pollutant in your sludge, or are able to determine the source of the pollutant.

- ***Perform a Site Investigation***. Whether or not a site investigation is required will depend on whether the exceedence was found before material was land applied, and the magnitude of the exceedence. You should use the general formulas in Chapter 419, Appendix A to estimate the concentration of pollutant that was loaded to the site, and the estimated concentration in site soil. For metals, compare these results to the standards in Chapter 419 Table 419.3. For other pollutants, compare the estimated soil concentration to the screening standards in Chapter 418, Appendix A. Based on these results, the Department will decide if you need to sample soil or other media at the utilization site to confirm the calculations, complete a risk assessment, remediate the site, stop using the site, and/or end your utilization program. (Did we mention that the results of all analysis should be reviewed before land applying your material?)

SECTION VII

Standards for All Sludge Land Application Sites

There are many standards that apply to sewage sludge, depending on the characteristics of the sludge. These standards are explained in further detail in later sections of this guidance. However, the following standards apply to *all sludge sites,* regardless of sludge characteristics:

Setback to Water

A setback is a minimum distance that must be maintained between the boundary of a land application site and a specific feature**.** *Sludge cannot be spread within 75 feet of a river, perennial stream or great pond.*

Setback to Abutting Property

A setback is a minimum distance that must be maintained between the boundary of a land application site and a specific feature. An abutting landowner may submit to the Department, in writing, a request that a sludge land application site be located no closer than 50 feet from the abutting landowner's property line. When the Department receives such a request, the Department will notify the generator. Upon notification, the generator shall not spread sludge within 50 feet of the subject property boundary.

Sludge Placement

Sludge must not be placed such that it will be washed into any waters of the State

Ground Conditions

Sludge cannot be applied to ground which is frozen, snow-covered, or water-saturated ("water-saturated" means the water table is within fifteen inches of the ground surface).

Application Rates

The maximum application rate limitations, which includes sludge or sludge combined with other nutrients, are:

- agronomic rate for crop nitrogen requirement (see Appendix B)
- plant uptake rate for phosphorus when the sludge is used **either** in a direct watershed of a *Waterbody Most at Risk from New Development* (Appendix C) **or** on a row crop grown on a land slope greater than eight percent (8%).

Vegetative Cover

The site must have sufficient vegetative cover to properly uptake nutrients and to control erosion.

Crop Harvesting

Crops must be harvested and removed from the land application site prior to continued utilization, unless the nutrient budget has been adjusted to account for the nutrients returned to the soil from unharvested crops. For wooded sites, a certified forest management plan must be developed to include harvesting schedules.

Buffers

Setbacks are simply the distance between two features. Buffers, on the other hand, are *vegetated* areas between the edge of a sludge site, and a down gradient water body. The purpose of the vegetation is to filter out soil and pollutants from run-off before the run-off enters the water body. A filter area will not work if there is a channel to transport run-off through the buffer. Therefore, all buffers must be inspected prior to spreading each year. All buffer areas which show evidence of erosion, or channeled flow, must be repaired, re-contoured, re-seeded, mulched, or otherwise modified to create sheet flow.

Hydric Soils

Sludge cannot be spread on hydric soils without specific approval of the Department. Hydric soils are soils that are saturated for a sufficient time during the growing season to grow hydrophilic plants such as sedges. Some small portions of fields that are already in agricultural production have been drained such that they no longer grow hydrophilic plants. Sludge can *usually* be used on these areas. The bottom line is…stay out of wetlands. (See Appendix F).

Traffic

Land application site operators must make adequate provisions for safe and uncongested traffic movement of all types into, out of, and within the site. *This standard is met if <u>one</u> of the following applies*:

- the sludge is used as a topsoil replacement;
- the site is used for sludge land application one-time or less every five years; or
- sludge land application activities result in 16 or fewer additional vehicle trips per day, on any day.

If none of the above apply, then you must meet the traffic standards in Chapter 400, Section 4(D).

Harmony

The site and site operation must fit harmoniously into the natural environment. *This standard is met if <u>one</u> of the following applies*:

- the sludge replaces a virgin material, such as topsoil or fertilizer, in a construction project;
- the project is a mine reclamation, landfill closure, or remediation of a state-designed uncontrolled hazardous substance site; or
- the buffers required in Chapter 419, and in Chapter 400, Section E(1)(b), are met at the site.

Air Quality and Nuisances

The operation of a land application site must have no unreasonable adverse affect on air quality. This includes nuisance odor conditions. *This standard is met if <u>all</u> of the following are met:*

- Sludge must not be land applied within 300 feet of an occupied building, other than the site owner's residence or site operator's residence. The Department may require increased setbacks to prevent nuisance odor conditions at adjacent, occupied buildings;
- *A site-specific odor control plan must be developed* to address mitigation of odor impacts at adjacent occupied buildings. The plan might include some of the following elements:

  - limiting the number of days each year that you will be stockpiling and the number of days that you will be land applying. Plan out your spreading so that you can get in, do the job, and get out as quickly as possible;

  - timing applications in consideration of neighborhood activities or weather conditions to reduce odor impacts. Avoid spreading right before, or during, special town events and major holidays. Hot and humid weather will also cause odors to linger. These are the times when people typically have windows open. Also, people tend to be around more on weekends. Weigh these factors, along with the farmers needs, crop requirements, and the need to apply nitrogen during the active growing season to avoid groundwater impacts;

  - incorporating or injecting the residuals; and

  - using odor control agents such as approved woodash, cured compost, etc., on stockpiles that are causing, or may cause, odor problems.

- *At least one-day prior to each sludge spreading event*, the generator must inform the Department that sludge will be applied at the site. You can inform the Department via phone call, voice-mail message, letter, facsimile transmission, or e-mail. The notice can be provided to the Residuals Utilization Program of the Solid Waste Division at any of the Department's offices.

Treatment for Pathogen Reduction / Vector Attraction Reduction

For land application, sludge must be treated to at least a Class B standard. Most treatment plants use lime-stabilization as the preferred method of pathogen reduction and vector attraction reduction. To reduce **pathogens**, sufficient alkali material (typically hydrated lime) must be added to sludge to raise the pH of the sludge/lime mixture to 12 or higher after two hours of contact. To reduce **vector attraction** (i.e. reduce odors), the pH of the sludge/lime mixture must remain at 12 or higher for two hours, and must remain at 11.5 or higher for the following 22 hours.

All the Class B pathogen reduction and vector attraction reduction options are presented in Appendix D.

SECTION VIII

Nitrogen-containing Sewage Sludge

Sewage sludge is considered nitrogen-containing if it has a carbon to nitrogen ratio of less than 25:1. Most sewage sludge land applied in Maine is less than 25:1, therefore is considered nitrogen-containing. Principal concerns with nitrogen are: the potential for nitrogen to enter the groundwater if this nitrogen is not utilized by crop, or is not otherwise immobilized; the likelihood that nitrogen is entering groundwater at field-stacking sites; and, the potential for nuisance-odor generation due to a low C:N ratio. The following standards must be met at sites where nitrogen-containing sewage sludge is used:

Setbacks

A setback is a minimum distance that must be maintained between the boundary of the sludge spreading area and a specific feature. The site where you propose to spread nitrogen-containing sewage sludge must meet the *minimum* setbacks listed below:

Public well	500 feet
Private well	300 feet
Property line	25 feet
Bedrock outcrop	25 feet
Off-site dwelling / occupied building	300 feet

Surface water / Drainage feature	35 feet
Downslope sandy or gravelly soils (without a minimum six-inch soil cap of loamy fine sand or finer)	25 feet

The Department can require that you increase these setbacks if necessary to meet operating requirements in Chapter 419 and/or to meet Chapter 400, sections 3 and 4.

Soils

Any soils derived from outwash or stratified-drift parent material (i.e. sandy or gravelly soils) must have a minimum six-inch soil cap of loamy fine sand or finer. A Maine Certified soil scientist must determine these soil characteristics. A list of Maine Certified soil scientists can be obtained, for a fee of $10.00, by writing to: Office of Licensing and Registration, 35 State House Station, Augusta ME 04333-0035. **Spreading on these soil types must occur only during the optimal growing period for the crop, and cannot occur after September 15th of any year**. (See Appendix F).

Bedrock

If the land application site has a permanent, perennial crop, such as hay, the underlying bedrock must be at least ten (10) inches below the ground surface.

Spreading on areas with less than 20-inches to bedrock must occur only during the optimal growing period for the crop, and cannot occur after September 15th of any year. If you spread on areas less than 20-inches to bedrock, you must monitor available nitrogen within the soil root-zone and at 18-inches depth (or depth of refusal). This monitoring must occur at the beginning and the end of the growing season.

If the land application site is used for row crops, or other non-permanent crops, such as corn, then bedrock must be at least twenty (20) inches below the ground surface.

Any sludge which is incorporated into the soil, must be incorporated a minimum of ten-inches above bedrock.

(See Appendix F)

Slope

On agriculture sites, the land slope cannot exceed 15%. On forest sites, the land slope cannot exceed 25%.

Groundwater

Sludge must be applied a minimum of fifteen (15) inches above the groundwater surface. This pertains to incorporation as well as topdressing. Therefore, if sludge is incorporated into the soil, there must be at least fifteen inches between the lower limit of incorporation and the groundwater surface.

SECTION IX

This section contains more standards if the sewage sludge contains heavy metals, contains pathogens, contains dioxin, or if the sewage sludge is used in a marine watershed, or supplies more phosphorus than required by the crop

Table 1

Heavy Metals

Metal	Column A Concentration (mg/kg dry weight)	Column B Concentration (mg/kg dry weight)
Arsenic	10	41
Cadmium	10	39
Chromium	1000	3000
Copper	1000	1500
Lead	300	300
Mercury	6	10
Molybdenum	75	75
Nickel	200	420
Selenium	100	100
Zinc	2000	2800

Heavy Metals

If the monthly average concentration (i.e. the average of all analyses performed during any given month) of *any heavy metal* exceeds the concentrations listed in Table 1, Column A above, then you will have to meet the standards listed in Section X.

If the monthly average concentration of *any heavy metal* exceeds the concentrations listed in Table 1, Column B above, then the sludge *cannot* be land applied.

If the monthly average concentration of *any heavy metal* is *between* the concentrations listed in Table 1, Column A and Table 1, Column B, then you must restrict sludge application to the annual loading rate listed in Table 2, Column C below:

Table 2

Annual Heavy Metals Loading Rate*

Metal	Column C (kg/ha)
Arsenic	0.5
Cadmium	1.9
Chromium	No Std.
Copper	75
Lead	15
Mercury	0.3
Molybdenum	No Std.
Nickel	20
Selenium	5
Zinc	140

*The Annual Heavy Metal Loading Rate (ALR) can be calculated using the following formula:

$ALR = LR * RP_c * 0.001$

Where:

ALR … Annual Heavy Metal Loading Rate in kg/ha
LR … Annual Residual Loading Rate in metric tons/ha
RP_c … Heavy Metal concentration in residual (mg/kg)
0.001 … Conversion factor

Heavy Metals and Other Stuff in Soil

Soils at sludge sites must be sampled if the monthly average concentration of heavy metals is between the values in Table 1, Column A and Column B. The samples must be analyzed for the various parameters listed in Table 3 below. The concentrations of these parameters must not exceed the concentrations listed in Table 3, Column E.

Table 3

Maximum Concentration of Various Parameters in the Soil at Sludge Utilization Sites

Parameter	Column E (mg/kg)
Aluminum	100,000
Arsenic	73
Barium	1500
Cadmium	39
Chromium	3000
Cobalt	70
Copper	1500
Lead	300
Mercury	6
Molybdenum	15
Nickel	420
Selenium	100
Silver	34
Vanadium	300
Zinc	2800

The number of soil samples and frequency of soil sampling must be proposed by the applicant to ensure adequate representation of the soil conditions at utilization sites. Initial, representative background samples should be collected and analyzed for all sewage sludge utilization sites.

Pathogens

Class B Pathogen Reduction achieves a pathogen kill of approximately 90%. The remaining 10% of pathogens are further reduced in concentration (not eliminated) by exposure to sunlight, wind, etc.

If the sewage sludge has been treated to Class B pathogen reduction standards, then you will have to meet the standards listed in Section X. The typical lime-stabilization methods used by wastewater treatment facilities achieve this Class B standard.

> *If treated to a Class B pathogen reduction standard, sludge cannot be applied to a floodplain after September 15th.*

Site Use Restrictions (Class B sludge utilization sites)

- Food crops with harvested parts that touch the sludge/soil, and are completely above the ground surface (e.g. pumpkins, squash, cucumbers, strawberries), cannot be harvested for at least fourteen (14) months after the last application of sludge.
- If the sludge remains on the land surface for at least four months before incorporation into the soil, food crops with harvested parts below the surface of the land (e.g. potatoes, carrots, beets) cannot be harvested for at least twenty (20) months after the last application of sludge.
- If the sludge remains on the land surface for less than four months before incorporation into the soil, food crops with harvested parts below the surface of the land (e.g. radishes, onions, carrots) cannot be harvested for at least thirty-eight (38) months after the last application of sludge.
- Food crops that do not touch the sludge or sludge/soil mixture (e.g. apples, raspberries), as well as feed crops, and fiber crops, cannot be harvested for at least thirty (30) days after the last application of sludge.
- Domestic animals (e.g. cows, horses, sheep) cannot be allowed to graze on sludge-amended sites for at least thirty (30) days after the last application of sludge.
- Turf cannot be harvested for at least one year after the last application of sludge.
- Topsoil cannot be mined from a site for at least thirty-eight (38) months after the last application of sludge.

Public Access Restrictions (Class B Sludge Utilization Sites)

- Public access to sludge utilization site which have a high potential for public contact (e.g. parks, golf courses, accessible agricultural land) must be restricted during land application and for at least one year after the last application of sludge. At a minimum, signs must be placed at common entranceways, unfenced open areas, and other appropriate locations to provide notice of restricted access.
- Public access to sludge utilization site which have a low potential for public contact (e.g. remote agricultural sites, remote forest land) must be restricted during land application and for at least thirty (30) days after the last application of sludge. The Department *may* require that signs be placed at common entranceways, unfenced open areas, and other appropriate locations to provide notice of restricted access.

Dioxin

If the sewage sludge has a dioxin concentration greater than 250 parts per trillion (ppt) 2,3,7,8, TCDD equivalents, then it cannot be land applied. Sludge in this category cannot be blended with other materials to reduce the dioxin concentration to meet utilization standards.

If the sewage sludge has a dioxin concentration greater than 27 ppt 2,3,7,8, TCDD equivalents, but less than 250 ppt, it is considered "dioxin-containing" and you will have to meet the standards listed in Section X. Some sewage sludges utilized in Maine have occasionally exceeded the 27 ppt threshold. In certain cases, generators have field stacked, or even spread sludge which has exceeded the 27 ppt standard. This demonstrates the need to review your sample analytical results **before** any sludge is spread.

Marine Watersheds

If the sewage sludge has a carbon to nitrogen ratio of less than 25:1 (i.e. "nitrogen-containing"), and is to be used in a direct marine watershed, then you will have to meet the standards listed in Section X. A direct marine watershed is a land area from which runoff is directly contributed to a tidal water.

Phosphorus

If the sewage sludge, by itself or in combination with other nutrients, will supply more than the annual crop uptake requirements of phosphorus, then the following applies:

- sludge cannot be applied to somewhat poorly-drained, or poorly-drained soil after September 15th each year (See Appendix F):
- sludge cannot be applied within 25 feet of a site waterway;
- land slopes cannot exceed 8% for row crops, 15% for perennial crops, and 25% for tree growth; and
- the standards listed in Section X must be met.

Section X

Buffers

Buffers are areas of vegetated land that run along the border between a land application area and adjacent surface water. The buffer is intended to protect the surface water from adverse affects of land application (*this is different than a setback*). The following minimum buffers must be established, ***unless*** you develop a site-specific erosion and sediment control plan*:

Buffer Characteristics	Distance, in feet, from application area to marine water, lake, pond, river, stream, brook, and intermittent stream with mineral bed
0-3% slopes, wooded	35
3-8% slopes, wooded	50
8-15% slopes, wooded	100
15-25% slopes, wooded	150
0-3% slopes, non-wooded	50
3-8% slopes, non-wooded	75
8-15% slopes, non-wooded	150

The slope and cover type listed above are for the characteristics of the *buffer*, not the characteristics of the land application site. A *non-wooded buffer* is a vegetated area, reverting area, grassed area, or forest area in which more than 40% of the timber has been harvested in the past ten years.

* A site-specific erosion control plan must include practices that will prevent erosion, and prevent sedimentation of water bodies adjacent to the fields where sludge is utilized. The Department must approve any plan that is developed. The plan must consider the control practices contained in the *State of Maine Nonpoint Source Pollution Management Plan*, published by the Maine Department of Environmental Protection, November 1989, updated 1992 (may be obtained from the Maine Department of Environmental Protection, Bureau of Land and Water Quality, 207-287-2111).

Setbacks

A setback is a minimum distance that must be maintained between the boundary of a land application site and a specific feature. In addition to the buffer requirements, a minimum 300-foot setback must be maintained from the high water mark of the following:

- surface water classified as GPA (Great Ponds A)
- lake, pond, or spring that is a public water supply
- the shoreline within one-mile upstream of the intake pipe on a stream or river that is a public drinking water supply

Slope

At an agricultural site, the land slope of the spreading area cannot be greater than 15% (remembering, of course, that if you spread on a row crop, you cannot exceed the crop removal rate for phosphorus if the land slope is greater than 8%).

At a forested site, the land slope of the spreading area cannot be greater than 25%.

More Dioxin Stuff

If you land apply sludge with a dioxin concentration **greater than** 27 ppt total 2,3,7,8 TCDD equivalents, then the following applies:

- representative soil samples must collected at the site within three months after the last application of sludge each year. The soil samples must be analyzed for PCDD/PCDF. If the concentration of PCDD/PCDF in the soil is equal to or greater than 27 ppt total 2,3,7,8 TCDD equivalents (dry weight), then the following restrictions apply to the site:

  - livestock and domestic fowl whose products are consumed by humans cannot be pastured on the site, ever;
  - crops for human consumption cannot be grown at the site…ever;

- **The above restrictions must be recorded in the property deed**, since the restrictions apply to the site in perpetuity. To achieve this, the landowner or licensee must prepare and record, in the appropriate Registry of Deeds, an instrument which describes: the location of sludge utilization; a statement that dioxin-containing sludge was applied to the site; a statement that the concentration of dioxin either met or exceeded the maximum allowable concentration of 27 ppt total 2,3,7,8 TCDD equivalents; and a statement explaining the above site use restrictions.

The sludge generator must submit evidence that the above information has been duly recorded with the appropriate Registry of Deeds. This information must be submitted to the Department within sixty (60) days after obtaining the soil sample analyses results.

Section XI

Department regulations, Chapter 405 requires that a minimum of one composite topsoil sample per eight (8) acres of utilization area must be collected at the site prior to utilization each year that a residual will be land applied. Results of the analyses* must be received and interpreted by the license holder prior to utilization. These results must be used as a factor in determining the amount of residual to be land applied.

*Analyses must be reported based on current soil pH, and not the pH management level or target pH.

STOP!!!

You need to stop spreading sludge if the:

- soil pH is greater than 6.5 standards units (SU), and the base saturation of the soil cation exchange capacity is less than 2.5% potassium or 10% magnesium (see below for methods to address this while continuing your land application program);
- base saturation of the soil cation exchange capacity is greater than 15 % sodium;
- soil pH is 7.5 SU or higher;
- sludge heavy metal concentration is greater than Column E (Table 3, section IX of this guidance)
- concentration of any parameter, other than heavy metals, in Chapter 418, Appendix A, is exceeded; or
- plant-available phosphorus concentration exceeds 100 pounds per acre, as determined by the Morgan-type extract, or equivalent.

START!!!

You can resume sludge spreading once you have satisfactorily demonstrated that any of the above situations that caused you to cease land application no longer apply to the site and/or sludge.

In the case of magnesium or potassium saturation imbalances, you must develop a plan to restore the soil. You may continues applying sludge at the site, provided these imbalances are actively addressed by supplementing the soil directly with these nutrients, or adding these nutrients to the sludge prior to spreading.

Section XII

Records

During the active operation of your sludge utilization program, you must keep the following records:

- Volume of sludge generated during the year***
- Volume of sludge utilized, processed, disposed, and stored during the year***
- Soil sampling and analyses results, including soil sampling locations
- Sludge sampling and analyses results
- A tabulation of the analytical data***
- A list of all licensed sludge utilization sites***
- A list of the licensed acreage at each site, and the licensed loading rate for each site***
- All information submitted to the Department as part of an application for approval
- A copy of each license issued by the Department
- A copy of any other information which is specifically required in your program license or site license(s).

(***annual report information requirements)

Reporting

Periodic Reports

Your program license may require that you submit reports to the Department periodically, throughout the year. A schedule for report submission will be established in the Program License.

Annual Reports

By **February 28th** of each year, you must submit an annual report detailing the sludge utilization activities during the previous calendar year. Unless otherwise approved in your Program License, the report must include all information denoted with *** in the record-keeping section above.

Annual Report Forms and Fees

Annual report forms may be obtained from the Department. Typically, the Department will send out blank report forms approximately two months before the submission deadline. A **fee** must accompany the completed forms. The Department will include a **notice of fees** with the blank report forms.

Section XIII

SLUDGE STORAGE

Storage of sludge may occur at a **field-stacking site**, which is a permeable surface, within the utilization site, with no permanent roof or other cover. Storage of sludge may also occur at a **contained storage facility**, which is a structure with an impervious surface and side walls.

Exemption

The following are exempt from siting, design, licensing, and operating requirements of Chapter 419:

- Storage of sludge within the boundaries of a wastewater treatment facility is exempt from solid waste licensing. To qualify for the exemption, stored sludge cannot exceed a footprint of one acre, and cannot be stored in excess of two years (you should, however, check with your individual DEP facility inspector to determine whether there are any issues of concern…like an acre of sludge stored for two years).

- Storage of sludge with a solids content of at least 12% may occur, **within a licensed utilization site** , for a period *not to exceed twelve (12) hours*. The intent of this exemption is to allow sludge to be off-loaded from a truck onto the ground, then scooped up and put into a spreader. If you have equipment failure, or other problems, you have 12 hours to resolve the issue and spread the material, otherwise the sludge must be removed from the site.

General Siting Standards for all Storage

The area where sludge is handled, for storage purposes, unless exempt, must be located as follows:

- minimum 500 feet from the nearest occupied building, other than a building owned by the site owner or the site operator
- minimum 100 feet from public roads
- minimum 100 feet from abutting property lines
- minimum 250 feet from a river, perennial stream, or great pond
- minimum 300 feet from a great pond that is a public drinking water supply
- not on a 100-year floodplain (unless the storage does not start until flood waters have receded, does not extend beyond September 15th; and does not occur for more than 30 days; and, the water table must be greater than twenty-four (24) inches below the ground surface for the duration of time that the sludge is stored…so you must monitor groundwater levels during active storage in a floodplain)

General Design and Environmental Standards for all Storage

All storage facilities must meet the following design and environmental standards, unless exempt:

- the storage facility, and use of the facility, cannot contaminate any water of the State
- contained storage areas must have impervious floors and sidewalls, sufficient to prevent untreated leachate from discharging to groundwater and/or surface water
- the stored residual must not discharge to any protected natural resource. "Protected natural resource" means a coastal sand dune system, coastal wetlands, significant wildlife habitat, fragile mountain areas, freshwater wetlands, great ponds or rivers, streams or brooks, as these terms are defined in 38 MRSA section 480-B of the Natural Resources Protection Act.
- runoff from surrounding land areas must be diverted away from the storage area
- the storage area must have provisions for containment and collection of leachate. Leachate, and run-off mixed with leachate, must be treated. A roof or other covering can be installed to prevent excessive leachate generation. A permanently vegetated filter strip can be established, upon Department approval, to receive leachate discharge during the growing season. Additionally, a plan can be developed for other methods of leachate management/disposal. If any leachate, wastewater, or washdown waters are proposed to be disposed, this must be done in accordance with 38 MRSA, Sections 413 *et seq*.
- stored sludge must not cause an odor nuisance at occupied buildings or protected locations (see Appendix E for the definition of "protected location")
- public access to sludge storage areas must be restricted. This can be accomplished by placing a sign at the access to a storage site. The sign mustcontain language that indicates that access is restricted to authorized personnel only. If the Department finds that access must be further restricted, the Department may require that a gate and/or fencing be installed.
- the storage site must be accessible during inclement weather
- if the site is jointly utilized, or more than one material is stored there, each stored residual must be adequately separated. The storage areas must be clearly labeled so that the correct material is placed in the correct location. Each stored residual must be stored such that it does not contaminate another residual. For instance, Class A compost should not be stored down gradient of a Class B sewage sludge.

Field Stacking –Additional Standards

In addition to the standards above, the following standards must be met at a field stacking site:

- field stacking must occur on the field where the sludge will be utilized.
- the volume of sludge stored at a stacking site cannot exceed that volume required to meet the spreading requirements for one spreading season
- stacked sludge cannot cover an area in excess of one-half acre (21,780 square feet) at any one stacking site
- the soils at a stacking area must have a maximum permeability, in the C-horizon, of 2.0 inches per hour or less. (See Appendix F). The Department may require that a Maine Certified soil scientist determine this.
- the stacking area cannot exceed a ground slope of three (3) percent.
- if the storage is to occur for thirty (30) days or less, the depth-to-bedrock at the stacking area must be a minimum of thirty (30) inches. (See Appendix F).
- if the storage is to occur for thirty (30) days or less, the depth to the existing water table must be no less than twenty-four (24) inches below the ground surface, for the duration of time that the sludge is stored. (See Appendix F).
- if storage is to occur for more than thirty (30) days, the depth-to-bedrock at the stacking area must be a minimum of forty (40) inches. A site with at least thirty (30) inches to bedrock can be modified, by placing appropriate fill material, to achieve the forty-inch bedrock separation. (See Appendix F).
- if storage is to occur for more than thirty (30) days, the depth to the seasonal high water table must be no less than twenty-four (24) inches below the ground surface. (See Appendix F)
- any leachate generated from a field stacking site must not travel beyond the approved spreading area. **Applicants must develop and implement a leachate control plan**. The plan may include: maintenance if filter strips during the growing season (NRCS Practice #393 may be used to design filter strips); placement of sludge on absorbent material (such as sawdust, approved paper fiber, etc.) to absorb any free liquid; placement of hay bales, silt fences, or other containment around the stockpile; or providing other leachate containment and collection.

Depth-to-bedrock and depth-to-watertable must be determined by on-site investigation.

Operating Standards for Storage

Operations manual

If you have a site-specific license for sludge storage, an operations manual must be prepared. The manual must be developed such that facility personnel can determine the exact procedures to follow to operate the storage facility in compliance with the rules and the site license. A current copy of the operations manual must be available at the storage facility, if it is a permanent structure, or at the generator facility if the manual is for field stacking sites. For stacking sites approved under the former Chapter 567 regulations, the operating manual should have been submitted by **July 19, 2000**.

Dust and Odor

The stored sludge must not cause an odor or dust nuisance at an occupied building or protected location.

Traffic

The storage activity must result in sixteen (16) or fewer additional vehicle trips per day to and from the site, unless otherwise approved by the Department.

Site Access

If gates are required at the storage site, these must be closed and locked except when an authorized person is on duty to monitor the site activities. Access roads must be maintained to allow for proper vehicle flow. Livestock and other domestic animals must be excluded from the storage facility and any leachate treatment areas, for at least thirty (30) days after sludge is removed from the storage area. Exclusion of animals is to be achieved by establishing fences.

Erosion and Sediment Control

If the storage location will be altered by disturbing the soil, erosion and sediment control measures must be instituted (refer to the *Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices*. Cumberland County SWCD and Department of Environmental Protection, March 1991)

Harmony

To fit the storage site harmoniously into the environment, the site must meet all buffer requirements in this guidance and in the specific program and/or site license.

Construction

For permanent storage structures, the licensee must submit a certificate of construction within thirty (30) days after the construction is complete. The certificate must include a statement that the facility has been built in accordance with the Department-approved drawings, specifications, and license requirements.

Inspection

For permanent storage structures, the licensee must inspectthe facility at least once each year. The inspection record must indicate the facility condition, repairs required, and repairs performed.

Monitoring

Any waste characterization and environmental monitoring program approved by the Department must be properly implemented.

Record-Keeping

The licensee must maintain records, for a minimum of five (5) years, of the annual volume of sludge stored and removed from the site, the dates of storage and removal, problems encountered during operation, remedies to problems, and any other records specifically required as a license condition.

Reporting

On or before February 28 of each year, the licensee must submit an annual report that details the previous year's storage activities.

More Operational Standards for Field Stacking

In addition to the above standards, the following standards must be met at field stacking sites:

Pathogens and Vectors

Sludge must have achieved, at a minimum, the Class B pathogen reduction and vector attraction reduction standards *prior to* field stacking.

Solids Content

Sludge must have sufficient solids content to stack *and maintain* a side slope such that for every three (3) feet of run the pile must rise *at least* one (1) foot. The sludge must not be self-levelling.

Shape

The stacked sludge must form *and maintain* a shape that sheds water.

Soil Standards

If the soil permeability in the C-horizon is between 0.6 and 2.0 inches per hour (as determined by a Maine certified soil scientist), the sludge must be stored on a geomembrane, stored on an absorbent material with a minimum carbon-to-nitrogen ratio of 100:1 (the material must be placed at a compacted depth of no less than eight inches), or immediately covered with a tarp or minimum 6 mil plastic. These efforts must ensure that water does not pass through the stockpile and reach the soil C-horizon. (See Appendix F).

Length of Storage

Sludge cannot be field-stacked any longer than 240 days.

- ***After October 30, 2002****, sludge cannot be stacked any longer than thirty (30) days, except on in-situ soils with a C-horizon that is comprised of marine sediment, lacustrine sediment, or basal till that is at least 40-inches thick (as determined by a Maine certified soil scientist. (See Appendix F).*

Mitigation

After removal of sludge from a field stacking site, the stacking area must be immediately tilled or harrowed, and re-seeded to allow for growth of a full, healthy groundcover, to scavenge nitrogen and prevent erosion.

Storage Site Closure

Within ten (10) days after the permanent closure of a storage site, the licensee must notify the Department of the closure.

The storage site must be closed to minimize the need for any further maintenance. The closed site cannot pollute the waters of the state; cannot contaminate the ambient air; cannot constitute a hazard to health or welfare; and, cannot create a nuisance. For permanent storage structures, the licensee must remove all stored sludge, and fully clean the site and all related equipment.

Appendix A

Public and Abutter Notification Requirements

Within 30 days prior to filing an application to the Department, an applicant must provide a Notice of Intent to File a new or amendment application, or a re-submitted application that has been returned as incomplete. The notice must be sent, by certified mail, return receipt requested, to abutters and to the municipal office of the municipality(ies) in which the project is located. The notice must be published at least once in a newspaper circulated in the area where the project is located, and a copy of the Notice of Intent to File must be submitted with the application.

Appendix B

SLUDGE APPLICATION RATE CALCULATIONS DEWATERED SLUDGE EXAMPLE

Example Provided For Secondary Treatment, Activated Sludge Facility:

CRITICAL DATA

Percent Dry Solids:	**31**%	Organic N:	**1.7**%
TKN:	**2.1**%	Ammonia N:	**0.39**%

First Year

(% Mineralization Rate x Organic N) + Inorganic N = % Available N

(0.40 x 1.7) + (0.39 / 2) = 0.875 % Available N

(In the above example, inorganic N is divided by 2. This is because up to 50% of the N is lost due to volatilization when sludge is topdressed. No volatilization is accounted for if sludge is incorporated into the soil)

Application Rate = $\frac{\text{Pounds of N Required for Crop}}{\text{\% Available N (as decimal) x \% Solids (as decimal) x 2,000 LBS/TON}}$

$$\frac{\textbf{120 Pounds (Topdressing Hay)}}{\textbf{0.00875 x 0.31 x 2000 LBS/TON}} = \textbf{\~22.12 WET TONS/AC.}$$

22.12 WET TONS/ACRE x 2000 LBS/TON / 1700 LBS/ YD^3 = **26 YD^3/AC.**

To Estimate Carryover N From Spreading in first year:

WET TONS/AC. of Sludge x % Solids (as decimal) = DRY TONS/AC. of Sludge

DRY TONS/AC. of Sludge x 2000 LBS/TON x % Org. N (as decimal) = LBS Org. N /AC.

22.12 WET TONS/AC. (spread in first year) x 0.31 (For % Solids) = ~ 6.86 DRY TONS/AC.

6.86 DRY TONS/AC. x 2000 LBS/TON x 0.017 (For % Org. N) = 233.24 LBS Org. N/AC.

CARRYOVER N FROM SLUDGE SPREADING IN FIRST YEAR:

For 2nd Year : 0.12 x 233.24 LBS Org. N = **28 LBS N/AC.**
For 3rd Year : 0.048 x 233.24 LBS Org. N = **11.2 LBS N/AC**.
For 4th Year : 0.0216 x 233.24 LBS Org. N = **5.04 LBS N/AC.**

Second Year

Identical Critical Data, Except **Only 92 LBS N/AC.** Required for Topdressing Hay (120 lbs./ac required by the crop - 28 lbs/ac already supplied from the first year spreading):

Therefore: **92 Pounds (Topdressing Hay)** / **0.00875 x 0.31 x 2000 LBS/TON** = **~16.96 WET TONS/AC.**

16.92 WET TONS/ACRE x 2000 LBS/TON / 1700 LBS/ YD^3 = **~20 YD^3/AC.**

To Estimate Carryover N From Spreading in Second Year:

16.96 WET TONS/AC. (spread in second year) x 0.31 (For % Solids) = ~ 5.26 DRY TONS/AC.

5.26 DRY TONS/AC. x 2000 LBS/TON x 0.017 (For % Org. N) = 178.8 LBS Org. N/AC.

CARRYOVER N FROM SLUDGE SPREADING IN SECOND YEAR:

For 3rd Year 0.12 x 178.8 LBS Org. N = **21.5 LBS N/AC.**
For 4th Year: 0.048 x 178.8 LBS Org. N = **8.6 LBS N/AC**.
For 5th Year: 0.0216 x 178.8 LBS Org. N = **3.86 LBS N/AC.**

Third Year

Identical Critical Data, Except **Only 87.3 LBS N/AC.** Required for Topdressing Hay (120 - 11.2 - 21.5):

Therefore: **87.3 Pounds N (Topdressing Hay)** / **0.00875 x 0.31 x 2000 LBS/TON** = **~16.1 WET TONS/AC.**

16.1 WET TONS/ACRE x 2000 LBS/TON / 1700 LBS/ YD^3 = **18.9 YD^3/AC.**

To Estimate Carryover N From Spreading in Third Year:

16.1 WET TONS/AC. (spread in third year) x 0.31 (For % Solids) = ~ 5 DRY TONS/AC.

5 DRY TONS/AC. x 2000 LBS/TON x 0.017 (For % Org. N) = 170 LBS Org. N/AC.

CARRYOVER N FROM SLUDGE SPREADING IN THIRD YEAR:

For 4th Year: 0.12 x 170 LBS Org. N = **20.4 LBS N/AC.**
For 5th Year: 0.048 x 170 LBS Org. N = **8.16 LBS N/AC**.
For 6th Year: 0.0216 x 170 LBS Org. N = **3.67 LBS N/AC.**

Fourth Year

Identical Critical Data, Except **Only 85.96 LBS N/AC.** Required (120 - 5.04 - 8.6 - 20.4):

Therefore: $\frac{\textbf{85.96 Pounds N (Topdressing Hay)}}{\textbf{0.00875 x 0.31 x 2000 LBS/TON}}$ = **~15.85 WET TONS/AC.**

15.85 WET TONS/ACRE x 2000 LBS/TON / 1700 LBS/ YD^3 = **18.65 YD^3/AC.**

To Estimate Carryover N From Spreading in Fourth Year:

15.85 WET TONS/AC. (spread in fourth year) x 0.31 (For % Solids) = ~4.9 DRY TONS/AC.

4.9 DRY TONS/AC. x 2000 LBS/TON x 0.017 (For % Org. N) = 166.6 LBS Org. N/AC.

CARRYOVER N FROM SLUDGE SPREADING IN FOURTH YEAR:

For 5th Year: 0.12 x 166.6 LBS Org. N = **20 LBS N/AC.**
For 6th Year: 0.048 x 166.6 LBS Org. N = **8 LBS N/AC**.
For 7th Year: 0.0216 x 166.6 LBS Org. N = **3.6 LBS N/AC.**

87.98 LBS N/AC. would then be required for fifth year (120 - 3.86 - 8.16 - 20).

PHOSPHORUS APPLICATION RATE CALCULATIONS

Analytical Results - Sludge P Concentration

Available P: 4,900 mg/Kg = 0.49 % **lbs P x 2.29 = lbs P_2O_5**
Total P: 5,900 mg/Kg = 0.59 % **lbs P_2O_5 / 2.29 = lbs P**

For Corn, recommended application rate is 80 lbs P_2O_5 (~35 lbs P).
For each cutting of Hay, recommended rate is 25 lbs P_2O_5 (~11 lbs P)

$$\text{Application Rate} = \frac{\text{Pounds of P Required for Crop}}{\%\ P \times \%\ \text{Solids} \times 2{,}000\ \text{LBS/TON}}$$

Based on Available P:

$$\frac{\textbf{22 Pounds (2 Cuts Hay)}}{\textbf{0.0049 x 0.31 x 2000 LBS/TON}} = \textbf{~7.24 WET TONS/AC.}$$

8.56 WET TONS/ACRE x 2000 LBS/TON / 1700 LBS/ YD^3 = **8.52 YD^3/AC.**

Based on Total P:

$$\frac{\textbf{22 Pounds (2 Cuts Hay)}}{\textbf{0.0059 x 0.31 x 2000 LBS/TON}} = \textbf{~6.01 WET TONS/AC.}$$

6.01 WET TONS/ACRE x 2000 LBS/TON / 1700 LBS/ YD^3 = **7.07 YD^3/AC.**

PHOSPHORUS APPLICATION RATE CALCULATIONS - LIQUID SLUDGE EXAMPLE

Analytical Results - Sludge P Concentration

Total P: 1470 ppm = .147%
% Solids: 6.92%

$$\frac{\textbf{35 Pounds (for Corn)}}{\textbf{0.00147 x 0.0692 x 8.34 LBS/GAL}} = \textbf{~41,255 GALS/AC.}$$

$$\frac{\textbf{22 Pounds (2 Cuts Hay)}}{\textbf{0.00147 x 0.0692 x 8.34 LBS/GAL}} = \textbf{~25,932 GALS/AC.}$$

SLUDGE APPLICATION RATE CALCULATIONS- LIQUID SLUDGE EXAMPLE

Example Provided For Secondary Treatment, Aerobically Digested Sludge: **CRITICAL DATA**

Percent Dry Solids: **6.92**%
TKN: **0.87**%
Organic N: **0.64**%
Ammonia N: **0.23**%

First Year

% Available N = (% Mineralization Rate x Organic N) + Inorganic N

(0.30 x 0.64) + (0.23 / 2) = 0.307 % Available N

$$\text{Application Rate} = \frac{\text{Pounds of N Required for Crop}}{\text{\% Available N x \% Solids x 8.34 LBS/GAL}}$$

$$\frac{\textbf{120 Pounds (Topdressing Hay)}}{\textbf{0.00307 x 0.0692 x 8.34 LBS/GAL}} = \textbf{~67,728 GALS/AC.}$$

To Estimate Carryover N From Spreading in First Year:

GALS/AC. x 8.34 LBS/GAL x % Dry Solids = DRY LBS Sludge/AC.

DRY LBS Sludge/AC. x % Org. N = LBS Org. N Applied/AC.

67,728 GALS/AC. (spread in first year) x 8.34 LBS/GAL x 0.0692 = ~39,088 DRY LBS Sludge/AC.

39,088 DRY LBS Sludge/AC. x 0.0064 (For % Org. N) = 250.16 LBS Org. N/AC.

CARRYOVER N FROM SLUDGE SPREADING IN FIRST YEAR:

For 2nd Year: 0.105 x 250.16 LBS Org. N = **26.3 LBS N/AC.**
For 3rd Year: 0.0476 x 250.16 LBS Org. N = **11.9 LBS N/AC**.
For 4th Year: 0.0219 x 250.16 LBS Org. N = **5.5 LBS N/AC.**

Liquid Sludge Example

Second Year

Identical Critical Data, Except **Only 93.7 LBS N/AC.** Required for Topdressing Hay (120 - 26.3):

Therefore: $\frac{\textbf{93.7 Pounds (Topdressing Hay)}}{\textbf{0.00307 x 0.0692 x 8.34 LBS/GAL}}$ **= ~52,885 GALS/AC.**

To Estimate Carryover N From Spreading in Second Year:

52,885 GALS/AC. (spread in second year) x 8.34 LBS/GAL x 0.0692 = ~30,521 DRY LBS Sludge/AC.

30,521 DRY LBS Sludge/AC. x 0.0064 (For % Org. N) = 195.33 LBS Org. N/AC.

CARRYOVER N FROM SLUDGE SPREADING IN SECOND YEAR:

For 3rd Year: 0.105 x 195.33 LBS Org. N = **20.5 LBS N/AC.**
For 4th Year: 0.0476 x 195.33 LBS Org. N = **9.3 LBS N/AC.**
For 5th Year: 0.0219 x 195.33 LBS Org. N = **4.3 LBS N/AC.**

Third Year

Identical Critical Data, Except **Only 87.3 LBS N/AC.** Required for Topdressing Hay (120 - 11.9 - 20.5):

Therefore: $\frac{\textbf{87.6 Pounds N (Topdressing Hay)}}{\textbf{0.00307 x 0.0692 x 8.34 LBS/GAL}}$ **= ~49,442 GALS/AC.**

To Estimate Carryover N From Spreading in Third Year:

49,442 GALS/AC. (spread in third year) x 8.34 LBS/GAL x 0.0692 = ~28,534 DRY LBS Sludge/AC.

28,534 DRY LBS Sludge/AC. x 0.0064 (For % Org. N) = 182.62 LBS Org. N/AC.

CARRYOVER N FROM SLUDGE SPREADING IN THIRD YEAR:

For 4th Year: 0.105 x 182.62 LBS Org. N = **19.2 LBS N/AC.**
For 5th Year: 0.0476 x 182.62 LBS Org. N = **8.7 LBS N/AC.**
For 6th Year: 0.0219 x 182.62 LBS Org. N = **4.0 LBS N/AC.**

Liquid Sludge Example

Fourth Year

Identical Critical Data, Except **Only 86 LBS N/AC.** Required (120 - 5.5 - 9.3 - 19.2):

Therefore: $\frac{\textbf{86 Pounds N (Topdressing Hay)}}{\textbf{0.00307 x 0.0692 x 8.34 LBS/GAL}}$ = **~48,539 GALS/AC.**

To Estimate Carryover N From Spreading in Fourth Year:

48,539 GALS/AC. (spread in 2002) x 8.34 LBS/GAL x 0.0692 = ~28,013 DRY LBS Sludge/AC.

28,013 DRY LBS Sludge/AC. x 0.0064 (For % Org. N) = 179.28 LBS Org. N/AC.

CARRYOVER N FROM SLUDGE SPREADING IN FOURTH YEAR:

For 5th Year: 0.105 x 179.28 LBS Org. N = **18.8 LBS N/AC.**
For 6th Year: 0.0476 x 179.28 LBS Org. N = **8.5 LBS N/AC.**
For 7th Year: 0.0219 x 179.28 LBS Org. N = **3.9 LBS N/AC.**

88.2 LBS N/AC. would then be required for fifth year(120 - 4.3 - 8.7 - 18.8).

Appendix C

Lakes Most at Risk from Development

Last Revised: Thursday, May 16, 2002

LAKE	TOWN
ADAMS POND	BOOTHBAY
ADAMS POND	NEWFIELD
ADAMS POND	BRIDGTON
ALLEN POND	GREENE
ANASAGUNTICOOK LAKE	CANTON
ANDERSON POND	AUGUSTA
ANNABESSACOOK LAKE (X)	WINTHROP
BARTLETT POND	WATERBORO
BAUNEG BEG POND	SANFORD
BAY OF NAPLES	NAPLES
BEAVER POND	BRIDGTON
BERRY POND	WINTHROP
BERRY POND	GREENE
BIRCH HARBOR POND	WINTER HARBOR
BLACK POND	SWEDEN
BONNY EAGLE LAKE	BUXTON
BOULTER POND	YORK
BOYD POND	LIMINGTON
BRANCH LAKE	ELLSWORTH
BRANCH POND	CHINA
BRETTUNS POND	LIVERMORE
BUKER POND	LITCHFIELD
BUNGANUT POND	LYMAN
BURNTLAND POND	STONINGTON
CARLTON POND	WINTHROP
CHAFFIN POND	WINDHAM
CHASES POND	YORK
CHICKAWAUKIE POND	ROCKPORT
CHINA LAKE	CHINA
CITY POND	SANDY RIVER PLANTATION
COBBOSSECONTEE LAKE (X)	WINTHROP
COCHNEWAGON LAKE	MONMOUTH
COFFEE POND	CASCO
COLD RAIN POND	NAPLES
CRAWFORD POND	WARREN
CRESCENT POND	RAYMOND
CRYSTAL LAKE	GRAY
CRYSTAL POND	TURNER
DAM POND	AUGUSTA
DAMARISCOTTA LAKE, MIDDLE AND SOUTH BASINS	NOBLEBORO
DAVIS POND	HOLDEN
DEER POND	HOLLIS
DEERING POND	SANFORD
DESERT POND	MOUNT VERNON
DEXTER POND	WINTHROP
DODGE POND	RANGELEY
DUCKPUDDLE POND	WALDOBORO
DUMPLING POND	CASCO
DUTTON POND	CHINA ALBION
EAGLE LAKE	BAR HARBOR
EAST POND	SMITHFIELD
ECHO LAKE	PRESQUE ISLE
ELL POND	SANFORD
ESTES LAKE	SANFORD
ETNA POND	STETSON
FAIRBANKS POND	MANCHESTER
FLOODS POND	OTIS
FOLLY POND	VINALHAVEN
FOREST LAKE	WINDHAM
FRESH POND	NORTH HAVEN
GARDINER POND	WISCASSET
GARLAND POND	GARLAND
GRANNY KENT POND	SHAPLEIGH
GRASSY POND	ROCKPORT
GREAT POND	BELGRADE & ROME
GREAT POND	CAPE ELIZABETH
GREELEY POND	AUGUSTA
GREEN POND	OXFORD
HALEY POND	RANGELEY
HALF MOON POND	ST ALBANS
HALL POND	PARIS
HANCOCK POND	EMBDEN
HATCASE POND	DEDHAM
HERMON POND	HERMON
HIGHLAND LAKE	BRIDGTON
HIGHLAND LAKE	WINDHAM
HOBBS (LT PENNESSE.)	NORWAY
HOGAN POND	OXFORD
HOLBROOK POND	HOLDEN
HOLLAND POND	LIMERICK
HORNE POND	LIMINGTON
HOSMER POND	CAMDEN
HUTCHINSON POND	MANCHESTER
INGALLS POND	BRIDGTON
INGHAM POND	MOUNT VERNON
ISINGLASS POND	LIMINGTON
JACOB BUCK POND	BUCKSPORT
JIMMIE (JAMIES) POND	MANCHESTER
JIMMY POND	LITCHFIELD
JORDAN POND	MOUNT DESERT
KENNEBUNK POND	LYMAN
KEZAR POND	WINTHROP
KILLICK POND	HOLLIS
KNICKERBOCKER POND	BOOTHBAY
KNIGHT POND	SOUTH BERWICK
LAKE AUBURN	AUBURN
LAKE GEORGE	SKOWHEGAN
LAKE WOOD	BAR HARBOR
LILLY POND	ROCKPORT
LILY POND	SIDNEY
LILY POND	NEW GLOUCESTER
LITTLE COBBOSSEE	WINTHROP
LITTLE DUCK POND	WINDHAM
LITTLE MEDOMAK POND	WALDOBORO
LITTLE OSSIPEE	WATERBORO
LITTLE POND	DAMARISCOTTA
LITTLE PURGATORY POND	MONMOUTH
LITTLE SABATTUS	GREENE
LITTLE SEBAGO LAKE	WINDHAM
LITTLE TOGUS POND	AUGUSTA
LITTLE WATCHIC POND	STANDISH
LITTLE WILSON POND	TURNER
LONG LAKE	BRIDGTON
LONG POND	MOUNT DESERT
LONG POND	BUCKSPORT
LONG POND	SULLIVAN
LOON POND	SABATTUS
LOON POND	LITCHFIELD
LOVEJOY POND	ALBION
LOWER AND UPPER PONDS	SKOWHEGAN
LOWER HADLOCK POND	MOUNT DESERT
LOWER NARROWS POND	WINTHROP

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LOWER RANGE POND	POLAND	SALMON L (ELLIS P)	BELGRADE
MACES POND	ROCKPORT	SALMON STREAM POND	GUILFORD
MANSFIELD POND	HOPE	SAND POND	MONMOUTH
MARANACOOK LAKE	WINTHROP	SAND POND	LIMINGTON
MARSHALL POND	OXFORD	SANDY BOTTOM POND	TURNER
MCGRATH POND	OAKLAND	SANDY POND	FREEDOM
MEDOMAK POND	WALDOBORO	SAWYER POND	GREENVILLE
MEGUNTICOOK LAKE	LINCOLNVILLE	SCITUATE POND	YORK
MIDDLE BRANCH POND	ALFRED	SEBAGO LAKE	SEBAGO
MIDDLE RANGE POND	POLAND	SEBASTICOOK LAKE	NEWPORT
MIRROR LAKE	ROCKPORT	SECOND POND	DEDHAM
MOODY POND	LINCOLNVILLE	SEWALL POND	ARROWSIC
MOODY POND	WATERBORO	SHAKER POND	ALFRED
MOOSE HILL POND	LIVERMORE FALLS	SHERMAN LAKE	NEWCASTLE
MOOSE POND	OTISFIELD	SHY BEAVER POND	SHAPLEIGH
MOUNT BLUE POND	AVON	SILVER LAKE	BUCKSPORT
MOUSAM LAKE	SHAPLEIGH	SPECTACLE POND	VASSALBORO
MUD POND	WINSLOW	STARBIRD POND	HARTLAND
MUD POND	CHINA	SWAN POND	LYMAN
MUD POND	WINDSOR	SWETTS POND	ORRINGTON
MUD POND	OXFORD	SYMMES POND	NEWFIELD
MURDOCK POND	BERWICK	TAYLOR POND	AUBURN
NEQUASSET POND	WOOLWICH	THOMAS POND	CASCO
NICHOLS POND	SWANVILLE	THOMPSON LAKE	OXFORD
NO NAME POND	LEWISTON	THREECORNERED POND	AUGUSTA
NOKOMIS POND	NEWPORT	THREEMILE POND (X)	WINDSOR
NORTH POND	NORWAY	TOGUS POND	AUGUSTA
NORTH POND	SUMNER	TOLMAN POND	AUGUSTA
NORTH POND	SMITHFIELD	TOOTHAKER POND	PHILLIPS
NORTON POND	LINCOLNVILLE	TRAVEL POND	JEFFERSON
NOTCHED POND	RAYMOND	TRICKEY POND	NAPLES
NUBBLE POND	RAYMOND	TRIPP POND	POLAND
OAKS POND	SKOWHEGAN	TYLER POND	MANCHESTER
OTTER POND	BRIDGTON	UNITY POND	UNITY
OTTER PONDS #2	STANDISH	UPPER NARROWS POND	WINTHROP
PANTHER POND	RAYMOND	UPPER RANGE POND	POLAND
PARADISE POND	DAMARISCOTTA	WADLEY POND	LYMAN
PARKER POND	CASCO	WARD POND	SIDNEY
PARKER POND	JAY	WARDS POND	LIMINGTON
PARKER POND	LYMAN	WARREN POND	SOUTH BERWICK
PATTEE POND	WINSLOW	WASSOOKEAG LAKE	DEXTER
PATTEN POND	HAMPDEN	WATCHIC POND	STANDISH
PEMAQUID POND	WALDOBORO	WEBBER POND (X)	VASSALBORO
PENNESSEEWASSEE	NORWAY	WEST GARLAND POND	GARLAND
PETINGILL POND	WINDHAM	WEST HARBOR POND	BOOTHBAY HARBOR
PLEASANT POND	TURNER	WHITES POND	PALMYRA
PLEASANT POND (X)	RICHMOND	WHITNEY POND	OXFORD
POVERTY POND	NEWFIELD	WHITTIER POND	ROME
QUIMBY POND	RANGELEY	WILEY POND	BOOTHBAY
RAYMOND POND	RAYMOND	WILSON POND	WAYNE
RICH MILL POND	STANDISH	WOOD POND	BRIDGTON
ROBERTS WADLEY POND	LYMAN	WOODBURY POND	MONMOUTH
ROCKY POND	ROCKPORT	WORTHLEY POND	POLAND
ROUND POND	RANGELEY	YORK POND	ELIOT
RUNAROUND POND	DURHAM	YOUNGS LAKE	WESTFIELD
SABATTUS POND (X)	GREENE		
SABBATHDAY LAKE	NEW GLOUCESTER		

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Appendix D

Class B Pathogen Reduction and Vector Attraction Reduction

Class B pathogen reduction process standards. Class B pathogen reduction standards must be met through one of the following processes:

A. Alkaline stabilization. Sufficient alkali material, such as lime, is added to the residual to raise the pH of the residual to 12 after two hours of contact.

B. Aerobic digestion. Residual is agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature must be between 40 days at 20 degrees Celsius and 60 days at 15 degrees Celsius.

C. Air drying. Residual is dried on sand beds or on paved or unpaved basins. The residual dries for a minimum of three months. During two of the three months, the ambient average daily temperature is above zero degrees Celsius.

D. Anaerobic digestion. Residual is treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature must be between 15 days at 35 to 55 degrees Celsius and 60 days at 20 degrees Celsius.

E. Composting. In a compost system the minimum temperature of all the residual is 40 degrees Celsius or higher for five days. For four hours during the five days, the temperature in the compost pile exceeds 55 degrees Celsius.

F. Test Out. Seven samples of the residual must be less than either 2,000,000 Most Probable Number per gram of total solids (dry weight basis) or 2,000,000 Colony Forming Units per gram of total solids (dry weight basis).

G. Other. Other methods for the treatment of residuals will be approved on a case by case basis, when the generator demonstrates that the proposed process meets the standards in section 4 and Chapter 400, sections 3 and 4.

Class B vector attraction reduction standards. Class B vector attraction reduction standards must be met through one of the following residual handling practices:

A. Residual must be injected below the surface of the land. No significant amount of the residual must be present on the land surface within one hour after the residual is injected.

B. Residual applied to the land surface must be incorporated into the soil within six hours after application.

C. The pH of residual must be raised to 12 or higher by alkali addition and, without the addition of more alkali, must remain at 12 or higher for two hours and then at 11.5 or higher for an additional 22 hours.

D. Other methods for the treatment of residuals will be approved on a case by case basis, when the generator demonstrates that the proposed process meets the standards in section 4 and Chapter 400, sections 3 and 4.

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Appendix E

Definition - Protected Locations

Pursuant to Chapter 400, "protected location" means:

(1) Any location within a parcel of land which, at the time a solid waste facility application is submitted, either contains or has local approval for the construction of a residence, residential subdivision, house of worship, academic school, college, library, hospital or nursing home;

(2) Any location within:

(a) A state park;

(b) Baxter State Park;

(c) A National park;

(d) A historic site;

(e) A nature preserve owned by the Maine or National Audubon Society or the Maine Chapter of the Nature Conservancy;

(f) The Appalachian Trail;

(g) A National Wildlife Refuge;

(h) A federally-designated wilderness area; or

(i) State wilderness area designated by state statute, such as the Allagash Wilderness Waterway; or

(3) Any location within consolidated public reserve lands designated as a protected location by rule of the Bureau of Public Lands.

State and National Parks that do not have camping areas, houses of worship, schools, libraries, or historic sites are considered protected locations only during their regular hours of operation.

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Appendix F

Typical Characteristics of Soils Occurring in Maine

SOIL SERIES NAME	Less than ten inches to bedrock	10 to 20 inches to bedrock	20 to 40 inches to bedrock	Greater than 40 inches to bedrock	Seasonal high water table greater than 24 inches below surface	Somewhat Poorly Drained Soil	Poorly Drained Soil	Floodplain Soil	Hydric Soil	Maximum Permeability in C-horizon of 2.0 inches/hr.	Soil Derived from outwash or stratified-drift	C-horizon with >40 inches marine sediment, lacustrine sediment, or basal till
Abram	yes	no	no	no	no	no	no	no	no	no	no	no
Adams	no	no	no	yes	yes	no	no	no	no	no	yes	no
Allagash	no	no	no	yes	yes	no	no	no	no	no	yes	no
Au Gres	no	no	no	yes	no	yes	no	no	no	no	yes	no
Aurelie	no	no	no	yes	no	no	yes	no	yes	yes	no	yes
Bangor	no	no	no	yes	yes	no	no	no	no	yes	no	yes
Becket	no	no	no	yes	yes	no	no	no	no	yes	no	yes
Bemis	no	no	no	yes	no	no	yes	no	no	yes	no	yes
Berkshire	no	no	no	yes	yes	no	no	no	no	maybe	no	no
Biddeford	no	no	no	yes	no	no	no	no	yes	yes	no	yes
Boothbay	no	no	no	yes	no	no	no	no	no	yes	no	yes
Brayton	no	no	no	yes	no	no	yes	no	yes	yes	no	yes
Bucksport	no	no	no	yes	no	no	no	no	yes	yes	no	no
Burnham	no	no	no	yes	no	no	no	no	yes	yes	no	yes
Buxton	no	no	no	yes	no	no	no	no	no	yes	no	yes
Canaan	no	yes	no	no	no	no	no	no	no	no	no	no
Caribou	no	no	no	yes	yes	no	no	no	no	yes	no	yes
Charles	no	no	no	yes	no	no	yes	no	yes	yes	no	no
Chesuncook	no	no	no	yes	no	no	no	no	no	yes	no	yes
Chocorua	no	no	no	yes	no	no	no	no	yes	no	no	no

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SOIL SERIES NAME	Less than ten inches to bedrock	10 to 20 inches to bedrock	20 to 40 inches to bedrock	Greater than 40 inches to bedrock	Seasonal high water table greater than 24 inches below surface	Somewhat Poorly Drained Soil	Poorly Drained Soil	Floodplain Soil	Hydric Soil	Maximum Permeability in C-horizon of 2.0 inches/hr.	Soil Derived from outwash or stratified-drift	C-horizon with >40 inches marine sediment, lacustrine sediment, or basal till
Colonel	no	no	no	yes	no	yes	no	no	no	yes	no	yes
Colton	no	no	no	yes	yes	no	no	no	no	no	yes	no
Conant	no	no	no	yes	no	no	no	no	no	yes	no	yes
Cornish	no	no	no	yes	no	yes	no	yes	no	yes	no	no
Creasey	no	yes	no	no	no	no	no	no	no	maybe	no	no
Croghan	no	no	no	yes	no	no	no	no	no	no	yes	no
Daigle	no	no	no	yes	no	yes	no	no	no	yes	no	yes
Danforth	no	no	no	yes	yes	no	no	no	no	no	no	no
Dixfield	no	no	no	yes	no	no	no	no	no	yes	no	yes
Dixmont	no	no	no	yes	no	no	no	no	no	yes	no	yes
Duane	no	no	no	yes	no	no	no	no	no	no	yes	no
Easton	no	no	no	yes	no	no	no	no	no	yes	no	yes
Elliotsville	no	no	yes	no	no	no	no	no	no	yes	no	no
Elmwood	no	no	no	yes	no	no	no	no	no	yes	no	yes
Enchanted	no	no	no	yes	no	no	no	no	no	no	no	no
Finch	no	no	no	yes	no	yes	no	no	no	no	yes	no
Fryeburg	no	no	no	yes	yes	no	no	yes	no	yes	no	no
Gouldsboro	no	no	no	yes	no	no	no	no	yes	yes	no	yes
Hermon	no	no	no	yes	yes	no	no	no	no	no	no	no
Hogback	no	yes	no	no	no	no	no	no	no	no	no	no
Howland	no	no	no	yes	no	no	no	no	no	yes	no	yes
Kinsman	no	no	no	yes	no	no	yes	no	yes	no	yes	no

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SOIL SERIES NAME	Less than ten inches to bedrock	10 to 20 inches to bedrock	20 to 40 inches to bedrock	Greater than 40 inches to bedrock	Seasonal high water table greater than 24 inches below surface	Somewhat Poorly Drained Soil	Poorly Drained Soil	Floodplain Soil	Hydric Soil	Maximum Permeability in C-horizon of 2.0 inches/hr.	Soil Derived from outwash or stratified-drift	C-horizon with >40 inches marine sediment, lacustrine sediment, or basal till
Lamoine	no	no	no	yes	no	yes	no	no	no	yes	no	yes
Lille	no	no	no	yes	yes	no	no	yes	no	yes	no	no
Linneus	no	no	yes	no	no	no	no	no	no	yes	no	no
Lovewell	no	no	no	yes	no	no	no	yes	no	yes	no	no
Lyman	no	yes	no	no	no	no	no	no	no	no	no	no
Lyme	no	no	no	yes	no	no	yes	no	yes	maybe	no	no
Machias	no	no	no	yes	no	no	no	no	no	no	yes	no
Madawaska	no	no	no	yes	no	no	no	no	no	no	yes	no
Mahoosuc	no	no	no	yes	yes	no	no	no	no	no	no	no
Mapleton	no	no	yes	no	no	no	no	no	no	yes	no	no
Markey	no	no	no	yes	no	no	no	no	yes	no	no	no
Marlow	no	no	no	yes	yes	no	no	no	no	yes	no	yes
Masardis	no	no	no	yes	yes	no	no	no	no	no	yes	no
Medomak	no	no	no	yes	no	no	no	no	no	yes	no	no
Melrose	no	no	no	yes	yes	no	no	no	no	yes	no	yes
Monadnock	no	no	no	yes	yes	no	no	no	no	no	no	no
Monarda	no	no	no	yes	no	no	yes	no	yes	yes	no	yes
Monson	no	yes	no	no	no	no	no	no	no	yes	no	no
Moosilauke	no	no	no	yes	no	no	yes	no	yes	no	yes	no
Naskeag	no	no	yes	no	no	no	yes	no	yes	no	no	no
Naumberg	no	no	no	yes	no	no	yes	no	yes	no	yes	no
Nicholville	no	no	no	yes	no	no	no	no	no	yes	no	yes

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SOIL SERIES NAME	Less than ten inches to bedrock	10 to 20 inches to bedrock	20 to 40 inches to bedrock	Greater than 40 inches to bedrock	Seasonal high water table greater than 24 inches below surface	Somewhat Poorly Drained Soil	Poorly Drained Soil	Floodplain Soil	Hydric Soil	Maximum Permeability in C-horizon of 2.0 inches/hr.	Soil Derived from outwash or stratified-drift	C-horizon with >40 inches marine sediment, lacustrine sediment, or basal till
Ondawa	no	no	no	yes	yes	no	no	yes	no	no	no	no
Peacham	no	no	no	yes	no	no	no	no	yes	yes	no	yes
Penquis	no	no	yes	no	no	no	no	no	no	yes	no	no
Perham	no	no	no	yes	no	no	no	no	no	yes	no	yes
Peru	no	no	no	yes	no	no	no	no	no	yes	no	yes
Pillsbury	no	no	no	yes	no	no	yes	no	no	yes	no	yes
Plaisted	no	no	no	yes	yes	no	no	no	no	yes	no	yes
Podunk	no	no	no	yes	no	no	no	yes	no	no	no	no
Rawsonville	no	no	yes	no	no	no	no	no	no	maybe	no	no
Ricker	yes	no	no	no	no	no	no	no	no	no	no	no
Rifle	no	no	no	yes	no	no	no	no	yes	yes	no	no
Roundabout	no	no	no	yes	no	no	yes	no	yes	yes	no	yes
Rumney	no	no	no	yes	no	no	yes	no	yes	no	no	no
Saddleback	no	yes	no	yes	no	no	no	no	no	yes	no	yes
Salmon	no	no	no	yes	yes	no	no	no	no	yes	no	yes
Scantic	no	no	no	yes	no	no	yes	no	yes	yes	no	yes
Schoodic	yes	no	no	no	yes	no	no	no	no	no	no	no
Searsport	no	no	no	yes	no	no	no	no	yes	no	yes	no
Sebago	no	no	no	yes	no	no	no	no	yes	no	no	no
Sheepscot	no	no	no	yes	no	no	no	no	no	no	yes	no
Shirley	no	no	no	yes	no	no	no	no	no	no	no	no
Sisk	no	no	no	yes	yes	no	no	no	no	yes	no	yes

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SOIL SERIES NAME	Less than ten inches to bedrock	10 to 20 inches to bedrock	20 to 40 inches to bedrock	Greater than 40 inches to bedrock	Seasonal high water table greater than 24 inches below surface	Somewhat Poorly Drained Soil	Poorly Drained Soil	Floodplain Soil	Hydric Soil	Maximum Permeability in C-horizon of 2.0 inches/hr.	Soil Derived from outwash or stratified-drift	C-horizon with >40 inches marine sediment, lacustrine sediment, or basal till
Skerry	no	no	no	yes	no	no	no	no	no	no	no	no
Skowhegan	no	no	no	yes	no	no	no	no	no	no	yes	no
Stetson	no	no	no	yes	no	no	no	no	no	no	yes	no
Sunapee	no	no	no	yes	no	no	no	no	no	maybe	no	no
Sunday	no	no	no	yes	no	no	no	yes	no	no	no	no
Surplus	no	no	no	yes	no	no	no	no	no	yes	no	yes
Swanton	no	no	no	yes	no	yes	no	no	yes	yes	no	yes
Swanville	no	no	no	yes	no	no	yes	no	yes	yes	no	yes
Telos	no	no	no	yes	no	yes	no	no	no	yes	no	yes
Thorndike	no	yes	no	no	no	no	no	no	no	yes	no	no
Togus	no	no	no	yes	no	no	no	no	yes	yes	no	no
Tunbridge	no	no	yes	no	no	no	no	no	no	maybe	no	no
Vassalboro	no	no	no	yes	no	no	no	no	yes	no	no	no
Washburn	no	no	no	yes	no	no	no	no	yes	yes	no	yes
Waskish	no	no	no	yes	no	no	no	no	yes	no	no	no
Waumbek	no	no	no	yes	no	no	no	no	no	no	no	no
Westbury	no	no	no	yes	no	yes	no	no	no	yes	no	yes
Whately	no	no	no	yes	no	no	no	no	yes	yes	no	yes
Winnecook	no	no	yes	no	no	no	no	no	no	yes	no	no
Wonsqueak	no	no	no	yes	no	no	no	no	yes	yes	no	yes

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Several soil series names that were originally used in the county soil surveys no longer apply in Maine. Following is a table of many of the soil series names that you may encounter, and a list of the current soil series names to which you should refer.

Original Soil Series Name	Current Soil Series Name
Agawam	Allagash
Belgrade	Nicholville
Borohemist	Chocorua
Borosaprist	Bucksport
Canandaigua	Swanville
Deerfield	Croghan
Eldridge	Elmwood
Gloucester	Hermon
Hadley	Fryeburg
Hartland	Salmon
Hemists	Chocorua
Hinckley	Colton
Hollis	Lyman
Leicester	Brayton
Limerick	Charles
Merrimac	Stetson
Ninigret	Madawaska
Paxton	Marlow
Raynham	Roundabout
Ridgebury	Brayton
Saco	Medomak
Saprists	Bucksport
Saugatuck	Finch
Scarboro	Searsport
Scio	Nicholville
Suffield	Buxton
Walpole	Moosilauke
Windsor	Adams
Winooski	Lovewell
Whitman	Peacham
Woodbridge	Peru

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